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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,321	03/25/2005	Takayuki Taguchi	10921.0293USWO	6650
52835 7590 11/19/2008 HAMRE, SCHUMANN, MUELLER & LARSON, P.C. P.O. BOX 2902 MINNEAPOLIS, MN 55402-0902				
EXAMINER				
HORNING, JOEL G				
ART UNIT		PAPER NUMBER		
1792				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/529,321

**Applicant(s)**

TAGUCHI ET AL

**Examiner**

JOEL G. HORNING

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date 03-25-2005
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Information Disclosure Statement*

1. The information disclosure statement filed 03-25-2005 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Some of the references were not supplied. The IDS has been placed in the application file, and all references except where struck through have been considered.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. **Claims 1, 3, 4, 6-10, 13-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Derand et al (US 2002/0125135) in view of Harauchi et al (JP-2001294692 as machine and orally translated).

The instant claims are directed towards a method of producing an analytical tool comprising a polymeric substrate formed with a groove for moving a sample liquid and a cover bonded to the substrate to cover the groove. The method of production comprises hydrophilically treating the surface by a primary step of exposing the groove to a modifying gas and a secondary step of modifying the characteristics of the groove.

Derand et al teach a method for making a microfluidic device with grooves (microchannels) fabricated on a substrate surface [0001], preferably made from a polymer [0065], such as polyethylene [0068], which then is covered [0002]. The device is capable of analytical use, such as for capillary electrophoresis [0058]. They teach that it is desirable for the fluids to flow through the channels by capillary action (**claim 15**) and as a result, it is important the surface of the groove be hydrophilic [0012], however, plastics are often hydrophobic [0014], thus Derand et al teach that a hydrophilization treatment is used on the groove surface [0015]. However, they do not teach using the process of applicant.

However, Harauchi et al teach a method for easily giving a polymer, such as polyethylene [0011], a stable hydrophilic surface [0003]. They teach a process comprising a primary step of exposing the surface to a mixture of fluorine/oxygen/nitrogen gas (**claim 3**)[0010], which modifies the water contact angle (more hydrophilic) followed by a secondary exposure to air which has the effect of further reducing the contact angle (**claim 1**) [0011].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use the hydrophilizing process of Harauchi et al as the hydrophilizing process in the method of producing an analytical device of Derand et al in order to produce the desired hydrophilic surface since it was known to be a suitable process for hydrophilizing the surface and would produce predictable results.

4. Regarding **claim 4**, Harauchi et al use a 1:33 ratio of fluorine to oxygen [0010].
5. Regarding **claim 6 and 7**, Harauchi et al teach that the treatment takes place for 1 minute with a partial pressure of the modifying gas is at room temperature ( $\sim 20^{\circ}\text{C}$ ) and ordinary pressure ( $\sim 1013\text{hPa}$ ) [0010].
6. Regarding **claims 8-10**, an oral translation of the first sentence of Harauchi et al [0008] reads: "After the fluorine treatment it [the substrate] may be set aside in atmosphere or it may be washed with water and dried." Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to wash the substrate with water (bringing water into contact with the inner surface of the groove) (**claim 8**) as a known and taught alternative to setting it aside in atmosphere for the secondary modification step. Further the examiner takes official notice that it is well known to the art of washing things with water to either spray them with water (**claim 9**) or immerse them in a bath of water (**claim 10**). Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to either spray water on the treated substrate or immerse the substrate in a water bath in order to wash it since they were both known to be suitable and would produce predictable results.

7. Regarding **claims 13 and 14**, Harauchi et al teach that the contact angle becomes 14 degrees [0011].
8. Regarding **claim 16**, Derand et al teach that the width of the groove can be 10 microns and that the depth of the groove can be 10 microns [0061], it would have been obvious to a person of ordinary skill in the art at the time of invention to choose 10 microns for the depth and width of the groove because they were taught to be suitable and would produce predictable results. This would result in a 1:1 ratio.
9. Regarding **claims 17 and 18**, as stated above, Derand et al in view of Harauchi et al teach the use of a cover on the substrate surface, however, they do not teach when the cover should be attached. However, there are only three time periods when during which attachment of a cover to the surface can occur: before, during or after the hydrophillization treatment. Thus, it would have been obvious to one of ordinary skill in the art to attach the cover at any one of those time periods, including before (**claim 17**) or after (**claim 18**) hydrophillization, because one of ordinary skill in the art would have been able to attach the cover during those periods, with predictable and reasonable expectation of success.
10. **Claims 2, 5, 8, 11 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Derand et al in view of Harauchi et al further in view of Hruska et al (Journal of Fluorine Chemistry 105 (2001) pp 87-93).
11. Regarding **claims 2, 8, 11 and 12**, Harauchi et al do not teach what chemical change leaving the fluorine/oxygen treated substrate in air causes, however, Hruska et al teach that the subsequent exposure of such fluorine/oxygen treated polymers to

air causes them to react with the water present in the air (**claims 8 and 11**), hydrolyze, and form carboxyl groups (**claim 2**), which increase the surface energy of the substrate (section 3.2, paragraph 1). Thus it would have been obvious to a person of ordinary skill in the art at the time of invention that by exposing the substrate to air according to Harauchi et al they would be exposing the surface to water which would form carboxyl groups on the substrate surface and increase the surface energy.

Furthermore it would have been obvious to a person of ordinary skill in the art at the time of invention to positively cause the air to contain moisture in order to ensure that moisture is in the air and thus enable the carboxyl groups to be formed and render the surface more hydrophilic (**claim 12**).

12. Regarding **claim 5**, Harauchi et al further teach ranges in flow rates for fluorine and oxygen that overlap with applicant's claimed values [0008], but they do not teach controlling the ratio of fluorine to oxygen in a 1:10~20 ratio. However, Hruska et al teach that fluorine gas alone produces hydrophobic surfaces and that it is addition of oxygen to the gas flow that introduces polar groups into the substrate surface which can render the surface hydrophilic (section 1, paragraph 1) and teach controlling the relative amounts of oxygen and fluorine to effect the surface chemistry (table 1). Put another way, they teach that the amount of oxygen present in the fluorine gas mixture is a result effective variable which controls the polarity of the surface and the resulting hydrophilicity.

Thus it would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed ratios of fluorine to oxygen gas of "1:10~20 on a volume basis" through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

### ***Conclusion***

13. No current claims are allowed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the



Art Unit: 1792

Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./  
Examiner, Art Unit 1792

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1792